Short Resume/Synopsis of Ph.D. Topic

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"STUDIES ON BIOLOGY AND BACTERIAL DISEASES OF COMMON CARP *CYPRINUS CARPIO* (LINNAEUS 1758)"

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SHORT RESUME/ SYNOPSIS OF PH. D. TOPIC

"STUDIES ON BIOLOGY AND BACTERIAL DISEASES OF COMMON CARP *CYPRINUS CARPIO* (LINNAEUS 1758)"

1. A BRIEF RESUME OF PROPOSED WORK / PROBLEM

Common carp *Cyprinus carpio* is one of the widely cultured commercially important fresh water fish species in the world (FAO 2013).Fish*Cyprinus carpio* was studied to be the part of native European slow moving fresh lake. They generally spawn in the springs and early summer, preferring the shallow water with dense macrocyte cover. A typical female can produce 300,000 eggs.

They are considered to be an important food fish in various countries in the world.The estimated world catch of common carp per year exceeds 200,000 tons. Because of its high popularity, Common carp is the third most frequently introduced species worldwide. It is also being considered as a potential candidate for the commercial aquaculture. The fish would be collected, its taxonomic identity ascertained by standard morphological characterisation and molecular identification. Composition of different tissues in terms of vitamins, carbohydrates, lipids, important proteins and mineralswould be analysed to develop its nutrient profile.

India being a developing country, still some rural populations face the problem of malnutrition. Hence, there is the need for nutrient supplements in which *Cyprinus carpio* may play animportant role.Keeping this in view, the present study is designed for a detailed investigation of*Cyprinus carpio* including-

- Evaluation of water quality of Local Freshwater Habitat
- Taxonomy of *Cyprinus carpio.*
- Biological aspects of *Cyprinus carpio*.
- Growth pattern analysis of *Cyprinus carpio.*
- Biochemical Profile, Enzyme Profile and Haematology of *Cyprinus carpio.*
- Characterization of bacterial pathogensof *Cyprinus carpio*.

2. Introduction To Proposed Research Topic:

Freshwater Fishes has great significance in the life of mankind being an important natural source of protein and providing certain other useful products as well as economics sustenance to many nations. Fish and fishery products playing a significant role in satisfying not only nutritional need of mankind throughout the world, but also contributes much to development through better income, employment opportunities and increasing returns from resources use. There are a number of poor people in the world who rely on fisheries for food and income. More importantly, for many fish happens to be their primary sources of protein. Globally fish provides about 16% of the animal protein consumed by humans. Fish is also available sources of minerals and essential fatty acids to human beings. Fish has been repeatedly described as health promoting food category. The average global per-capita annual consumption of fish has also increased from about 12 kg in 1973 to nearly 16 kg in 1997 (Delgado et al., 2003). These factors have been responsible for an increase in total

consumption of food fish from 40MMT, in 1970 to 86MMT in 2000 and expected 140MMT by 2025 (FAO, 2009). Most natural fish stocks are unable to sustain even their current productivity in the face of heavy fishing pressure and declining environment quality. Contamination of water bodies might lead to a change in their trophic status and render them unsuitable for aquaculture. Several Physicochemical or biological factors could act as stressors and adversely affect fish growth and reproduction. Hence, regular monitoring of physicochemical and biological water quality parameters is essential to determine status of lakes with reference to fish culture.

The aquaculture of common carp, *Cyprinus carpio* is one of the biggest on global scale. Thus, common carp is under exploited, low cost and nutritiousfood. This fish has rapid growth and high fecundity.*Cyprinus carpio* is reported to have great medicinal and nutritious value which not only include the finest source of essential fatty acids, protein, minerals and fat-soluble vitamins like vitamin A, E and D, but also natural source of minerals including iodine, selenium,phosphorus, calcium, zinc, and magnesium.Hence, this investigation will undertake to study Biology and Bacterial Diseases of Common carp *Cyprinus carpio* (Linnaeus 1758) from Local freshwater sources of Nanded Region.

3. Survey or Review of Literature and Development in the Relevant Subject:

Cyprinus carpio belongs to the order Cypriniformes and the family Cyprinidae, which is considered the largest family of freshwater fish (Kloskowski J. 2011).They are counted due to their high nutritional contribution and high adaptive capability to both environment and food. Even in some European countries, more than 80% of total fish production comes from common carp. Also, various studies are being performed to identify appropriate methods to control common carp populations in wetlands and shallow lakes (Weber M.J.& Brown M.L., 2009).

Common carp shows the bottom-top effect on tropic level. The productivity of freshwater systems is limited by a lack of soluble phosphorus (PO_4-P), which acts as a limiting nutrient for phytoplankton growth. Therefore, common carp increases phytoplankton productivity by releasing nutrients including soluble phosphorus from the sediment. Hence, this accelerates the nutrient fluxes to the next trophic levels respectively.

Also in polyculture ponds, the optimum density of common carp can improve synergistic effects with other fish, which potentially increase nutrient retention efficiency in fish and decrease nutrient loss in the sediment (Rahman MM. 2015).Carp fish have moderately high energy profile including, 100 g holds 127 calories and 17.8 g/100 g (32% of RDI) of protein. Its white, flaky edible meat is firm and composes all the essential amino acids in good proportions.

It's lean meat is also a good source of polyunsaturated fatty acids (PUFA). Studies suggest that a diet rich in fish that are high in omega-3 fatty acids, can curb or prevent cognitive decline, dementia, depression,neuropsychiatric disorders, asthma, and inflammatory disorders (Rahman MM. 2015).

Carp meat contains only 0.110 ppm of mercury. USFDA has categorized Carp fish as the "best choice" section considering lowest mercury levels in its flesh. The recommended intake is 2-3 servings per week for Carp fish.

Carp is a moderate source of omega-3 eicosa-pentaenoic-acid (EPA), docosa-pantaenoic-acid (DPA) and docosa-hexaenoic-acid (DHA). Research studies suggest that these fatty acids,

particularly DHA, play an important role in the development of nervous system, especially in infants and children.

Energy profile of 100 g of carp holds 988 IU of vitamin D; about 165% of daily recommended intake. Vitamin D is found to play an important role in the calcium metabolism, and offers protection from cancers.Carp fish is also found to contain many B-complex vitamins such as niacin, pyridoxine (B-6),vitamin-B12. It is also a good source of vitamin-E, thiamine, and riboflavin (Rahman M.M.*et al.*2009).

4. Objectives of the Research and Proposed Hypothesis: -

The objectives of the study are to:

- Evaluate the water quality of Local Freshwater Habitat of common carp.
- Collection of common carp *Cyprinus carpio*from local freshwater sources.
- Study the taxonomy of *Cyprinus carpio*.
- Determine growth, Condition Factor, Sex ratio, Fecundity, length weight relationship, spawning season of common carp, Length at first sexual maturity (L50)and Spawning Season of common carp, *Cyprinus carpio*.
- Biochemical analysis (Carbohydrates, Proteins, Lipids,Vitaminsand Minerals) and Enzyme Profile, Haematological analysis of*Cyprinus carpio*.
- Understand the characteristics of microbial pathogens affecting the growth and proliferation of common carp*Cyprinus carpio*.
- Explore its application in diverse fields for human welfare.

5. Methodology to be Used and Adopted:

For Evaluation of water quality, Identification of Fish, Fish Biology, Biochemical Study, Enzyme Profile, Haematological Study, Microbial Study will be carried out by standard methods.

Freshwater fish *Cyprinus carpio* will be collected from local waterbodies in Nanded district.Its taxonomic identification, molecular characterisation would be done by standard protocol. Landmark genomic sequences of collected fish would be compared with the genomic sequence of *Cyprinus carpio* available online.

The biochemical analysis of nutrient profile including proteins, vitamins can be performed by using high throughput technologies and standard protocol described by Amalie et al.

Further, microbial pathogens can be analysed by performing some basic bacterial and fungal culture techniques.

Metabolite extraction can be done and various antibacterial & antifungal properties can be analysed against various fish and human pathogens as well. The metabolites showing significant activity would be identified using HPLC (High Performance Liquid Chromatography).

Study Area: *Cyprinus carpio* collected fromLocal Freshwater Habitat of Nanded Region.

6. Importance of study:

- **International Status-** *Cyprinus carpio*is an important fish food in various countries in the world. Its catch rate per year exceeds 200,000 tons and became the third most frequently introduced species by man worldwide.*Cyprinus carpio* has a very prominent role in aquaculture across the world. It is also being used for its medicinal benefit.

- **National Status-** Apart from its culture value globally, *Cyprinus carpio* has emerged as a prominent species in culture fishery. This species has also spawned a range of ornamental fish industries concerned with different varieties of "Koi" resulting from selective breeding. Having such a high energy profile of *Cyprinus carpio* can serve a good supplement in diet.
- **Regional Status**- The district of Nanded has a total of 409 reservoirs. The total water spread area available for fish culture is 6380 hectors out of which only a small portion is actually used.*Cypinus carpio*, being a hardy and culture suitable fish offers a good avenue for aquaculture in the water bodies available in the district.

- **Scope/Significance of study-** The proposed study will offer an understanding of the biology of *Cyprinus carpio.*This understanding of the biology of this fish could help and enable us to plan and execute better culture and management practices in the farms; like induced breeding, fish seed rearing and disease management. This study will also enable us to explore different ways and diverse applications of carp culture in the district.

7. **Proposed work Plan with a Tentative chapter scheme:**

The work plan of the proposed study can be summarised into following chapters respectively-

1. Introduction of Fisheries, Significance
2. Review of Literature
3. Physiography
4. Material and Methods
5. Physicochemical Parameters of Water during Study Period
6. Taxonomy of *Cyprinus carpio*
7. Biology of *Cyprinus carpio*
8. Bacterial Characterization
9. Summery and Conclusion
10. Bibliography.

8. **Proposed work Plan/ Formulation and Structure of Study:**

First Year-Reviewing of literature and methodology appropriate to use and exploration of different sources for the isolation of *Cyprinus carpio.* Collection and preservation of fishes.

Second Year-Study of spawning and growth pattern of collected fish. Its morphological identification and characterisation.

Third Year- Biochemical analysis and nutrient profile characterisation of fish edible flesh. Studying the various fish pathogen and other parameters responsible for declining of the yield and suggesting some alternate solutions to it.

Fourth Year-Compiling the findings and relating it to various applications. Writing thesis, analysing data and submission of thesis.

9. **Expected Outcome:**

From the proposed study, *Cyprinus carpio* is expected to yield a high nutritional content profile which can be utilised in diverse ways to serve human welfare in India facing the problems of malnutrition among people under the BPL. Research in fish biology can generate new knowledge

about developmental characteristics and physiological profile of *Cyprinus carpio*. The study of pathogens and factors that lead to decline in yield can help solve the problem and to attain the expected yield in culture.

The direction of this research work can be adjusted depending upon the findings from time to time, to attain the best expected result within the schedule.

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